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**SUPPLEMENTAL GROUND WATER FINAL REPORT**

**FOR THE**

**TRANSIT AMERICA INC. RED LION ROAD FACILITY**

*Ground Water Final Report - Submitted December, 1999*  
*Final Report For Soils - Submitted June, 2000*

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**Submitted by: Transit America Inc.**  
**One Red Lion Road**  
**Philadelphia, Pennsylvania 19115**

**Submitted to: Pennsylvania Department of Environmental Protection**  
**Environmental Cleanup Program**  
**Southeast Regional Office**  
**Conshohocken, Pa. 19428**

**Persuant to: Pennsylvania Land Recycling and**  
**Environmental Remediation Standards Act (Act 2)**

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**June 2000**

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## Section 1 - Introduction

This *Supplemental Ground Water Final Report* was prepared for the property owned by Transit America Inc. ("Transit America"), located on Red Lion Road in Philadelphia and Montgomery Counties, Pennsylvania ("Site"). The Site location is shown in Figure 1. In compliance with the Land Recycling and Environmental Remediation Standards Act (Act 2), the *Ground Water Final Report* (December 1999) was prepared for the Site after completion of ground water remedial activities in accordance with the PADEP-approved *Cleanup Plan* (March 1998). The *Ground Water Final Report* demonstrated the attainment of the selected Act 2 Site-Specific Standards for ground water and was approved by Pennsylvania Department of Environmental Protection (PADEP) on March 10, 2000.

The December 1999 *Ground Water Final Report* demonstrated the attainment of a residential Site-Specific Standard for ground water for two areas of the Site. These areas included the 20-acre South Parking Lot and a 17.6-acre contiguous strip of land along Pine Road and Red Lion Road in Montgomery County. These two areas, along with a contiguous area along Red Lion Road in Philadelphia County, meet the residential Statewide Health Standards for soil as documented in the *Final Report for Soils*, which addresses all Site conditions other than ground water and surface water.

The *Final Report for Soils* is being submitted concurrently with this document. The purpose of this *Supplemental Ground Water Final Report* is to document attainment of the residential Site-Specific Standards for ground water in a portion of the Site along Red Lion Road in Philadelphia County (Figure 2). Additionally, this *Supplemental Ground Water Final Report* provides documentation on the abandonment of the ground water monitoring wells and the former ground water extraction systems at the Site.

## Section 2 – Attainment Demonstration

The attainment demonstration for ground water, approved by PADEP in the *Ground Water Final Report* (December 1999), is revised to include a demonstration documenting the attainment of residential Site-Specific Standards at the Site in Philadelphia County along the north side of Red Lion Road (Figure 2) in compliance with Act 2.

### **2.1 Attainment of Numerical/No Exposure Pathway Site-Specific Standard**

A no exposure pathway (pathway elimination) standard, consistent with Act 2, was the approved Site-Specific Standard for regulated substances in ground water (VOCs and non-VOCs) at the Site. Numerical Site-Specific Standards were established for VOC concentrations in ground water based on the results of fate and transport modeling, including vapor intrusion modeling. As detailed in Section 3 of the *Ground Water Final Report*, ground water sampling and analyses for Point of Compliance monitoring wells in accordance with the *Cleanup Plan* demonstrated that the VOC concentrations are substantially below the established Act 2 numerical Site-Specific Standards. Based on the fate and transport evaluation and Point of Compliance attainment sampling results, the no exposure pathway standard was met for regulated substances in ground water. Other than an appropriate deed acknowledgement restricting the future use of ground water for drinking water or agricultural purposes, no further remedial action or institutional/engineering controls are required for VOCs and other regulated substances in ground water, in accordance with the PADEP-approved *Ground Water Final Report*.

## **2.2 Potential Residential Use Areas**

### **2.2.1 Residential Use Areas Previously Approved for Ground Water**

As detailed in the *Ground Water Final Report*, Transit America considered the potential for future residential land use in certain areas of the Site consistent with current or future zoning requirements and applicable Act 2 standards. These areas have been remediated consistent with Act 2 residential standards. As indicated in Section 1, two areas of the Site were specifically evaluated for potential residential use in the *Ground Water Final Report* and approved by the PADEP. These two areas, shown on Figure 2, are as follows:

- The approximately 17.6 acre area in the western/northwestern portion of the Site, along Pine Road and the northwestern corner within Montgomery County (referenced as "Pine Road/Montgomery County parcel").
- The 20-acre former South Parking Lot parcel, south of Red Lion Road ("South Lot parcel").

These two parcels were selected based upon the concentration of regulated substances in soil and the ground water exposure pathway conditions of these areas, as defined by Act 2, as follows:

- Soil concentrations meet the residential Statewide Health Standards for soil for regulated substances (see *Final Report for Soils*);

- Ground water VOC concentrations beneath these areas and immediately upgradient of these areas meet the numerical Site-Specific Standards for the vapor inhalation pathway assuming a residential exposure scenario.
- A deed restriction will prohibit the future use of ground water for drinking water or agricultural purposes to assure that these areas meet the no exposure pathway standard for regulated substances in ground water.

The ground water fate and transport modeling and residential vapor intrusion modeling that provided the basis for the *Ground Water Remedial Investigation Report* (March 1998) and the *Ground Water Final Report* can be summarized as follows:

- The ground water flow/VOC transport modeling considered and addressed the potential pathway of VOCs to ground water users (private/public water supply wells) and surface water. As ground water use will be deed restricted in these areas in accordance with Act 2, the ground water use/surface water pathway conditions will not change under the residential use scenario.
- The vapor intrusion pathway also was considered in this evaluation pursuant to the Act 2 regulations due to the potential for ground water containing VOCs to migrate beyond the Point of Compliance and the potential volatilization of VOCs from ground water into indoor air. The vapor intrusion evaluation (Section 6.03 of the *Ground Water Remedial Investigation Report*) utilized conservative residential (adult/child), basement exposure assumptions and USEPA Region III Risk Based Concentrations (RBCs) for ambient air.

- Using the RBC values, the vapor intrusion modeling developed ground water concentration screening criteria for VOCs detected at the Site for ground water depths of 2 to 20 feet below grade (Table 14 of the *Ground Water Remedial Investigation Report*). At or below these screening concentrations of VOCs in ground water, no vapor intrusion exposure occurs above the RBCs for residential indoor air.
- The ground water VOC vapor screening concentrations, using the more conservative ground water depth (2 feet), were compared to the maximum VOC concentrations detected in the perimeter wells at the Site as shown in the *Ground Water Remedial Investigation Report*. Because the ground water concentrations at the POC wells are below the levels that would potentially create an unacceptable inhalation exposure risk, there is no complete exposure pathway for downgradient, off-site VOCs in ground water beyond the Point of Compliance.

To consider potential future residential use of the Pine Road/Montgomery County and South Lot parcels, the ground water vapor intrusion pathway was evaluated due to the presence of the VOC plumes beneath these areas, as presented in the *Ground Water Final Report*. Historical VOC concentrations in ground water beneath and immediately upgradient of these areas were compared to the conservative ground water - vapor intrusion screening concentrations. The data demonstrated the absence of a vapor exposure pathway and the attainment of a residential Site-Specific Standard for ground water in these two areas. Accordingly, the *Ground Water Final Report* stated that the South Lot parcel and the Pine



Road/Montgomery County parcel will be surveyed and the deed acknowledgment will reflect the attainment of a Site-Specific Standard for ground water assuming a residential use.

### **2.2.2 Attainment Demonstration for Additional Residential Use Area for Ground Water**

Since completing the *Ground Water Final Report*, the portion of the Site along Red Lion Road within Philadelphia County ("Red Lion/Philadelphia County parcel") was re-evaluated to determine if it also could meet Act 2 residential standards. This additional area of 11.4 acres extends from the eastern property boundary of the Site along the Red Lion Road/Philadelphia County parcel, defined above, to the Philadelphia/ Montgomery County border (Figure 2) to be coterminous with the area meeting residential Statewide Health Standards for soil. The Red Lion Road/Philadelphia County parcel was re-evaluated for a potential vapor exposure pathway relative to the presence of VOC plumes, consistent with the analysis summarized above and detailed in Section 4.3 of the approved *Ground Water Final Report*. Extending the residential use area for ground water is achievable, consistent with the attainment demonstration set forth in the approved *Ground Water Final Report*.

For the residential use area along Red Lion Road in Philadelphia County of the Site (Figure 2), the ground water VOC concentrations hydraulically upgradient of this area would exceed the vapor intrusion screening criteria (the conservative 2 ft ground water depth screening criteria established in the *Cleanup Plan*). The VOC detections above the conservative vapor screening criteria are limited to former well locations within the interior of the Site and north of Red Lion Road. Although ground water VOC concentrations detected in former wells within the Red Lion Road/Philadelphia County parcel were consistently below

the ground water-vapor screening concentrations, it is conservatively concluded that a vapor exposure pathway would potentially exist for a residential use in this area, in the absence of an engineering control. Therefore, an engineering control will be mandated through an appropriate deed restriction to eliminate this potential vapor exposure pathway in the event a residential use is proposed for this area of the Site. The vapor pathway engineering control will consist of the requirement that all new buildings in this area meeting residential use criteria under Act 2 shall be constructed in a manner that will eliminate the potential vapor exposure pathway. The performance-based standards for this engineering control are detailed in Section 2.2.3 below.

### **2.2.3 Engineering Control for Vapor Pathway Elimination**

An engineering control will be used to attain a no exposure pathway Site-Specific Standard for residential use, consistent with Act 2, for the area in the Red Lion Road/Philadelphia County parcel as shown in Figure 2. This engineering control will be implemented in the form of a deed restriction and will consist of a requirement for the construction/installation of a vapor barrier for any building or occupied structure designated for residential use pursuant to the requirements of Act 2.

The engineering control may consist of an active or passive barrier system. Active building barrier systems for vapors typically divert potential VOC vapors from entering the building/structure using sub-slab depressurization techniques (i.e., making the sub-slab pressure across the entire slab lower than the indoor pressure using a fan or similar device). Passive building barrier systems, if selected, entail the installation of a subsurface vapor

membrane beneath the entire building/structure slab. Enhanced ventilation techniques may also be used with the vapor membrane installation as long as the performance-based standard is maintained. The vapor barrier would be installed/constructed to meet applicable building codes and prevent VOCs in ground water from migrating as vapors into the building/structures designated for residential use in excess of acceptable levels as calculated and presented in Section 6.03 of the *Ground Water Final Report*.

## Section 3 – Well Abandonment

### 3.1 – Well Abandonment

A well abandonment program was conducted after the collection and analysis of ground water attainment samples pursuant to the *Ground Water Final Report*. The PADEP well abandonment guidelines outlined in the *Ground Water Monitoring Guidance Manual* (PADEP, February 1996) were used to design and implement the abandonment procedures. The well abandonment program was implemented in two phases: Phase I wells and Phase II wells. Phase I of the well abandonment program, which included the abandonment of 78 monitoring, piezometer and former extraction wells that were not Point of Compliance wells, was completed in September 1999 after approval of the *Ground Water Remedial Investigation Report (Remedial Investigation Report, Volume 2)*. Phase I well abandonment activities are described in the *Ground Water Final Report*. The Phase II well abandonment was conducted after PADEP-approved *Ground Water Final Report* in March 2000 and included 18 monitoring/former extraction wells that were Point of Compliance wells.

Prior to conducting well abandonments, the pumps, piping, and associated metering equipment were removed from the extraction wells. The piping was staged at a designated location for off-site scrap/disposal. The water discharge line for each extraction system was sealed with a pressure cap and the de-energized electric power line was severed. Extraction well control panels were dismantled and taken off-site. Concrete bollards and well pads surrounding the wells were removed using a backhoe and the debris was staged at a designated location for off-site disposal. The well riser (inner) casing and outer protective casings were cut off at a minimum of 3 inches below the ground surface. Where appropriate, the well casings were cut lower to match the planned

cut area (soil excavation) pursuant to the final golf course design/grading plan. Each well was then pressure-grouted with a cement/bentonite grout mixture using a tremie pipe from the bottom of the well to ground surface. After allowing a minimum of 24 hours for settling, additional grout was added to restore the seal to the ground surface.

The Phase II well abandonment activities were completed in April 2000. The abandonments were completed by Samuel Stothoff Company, a licensed well driller, under the oversight of an O'Brien & Gere geologist. Completed Phase II well abandonment forms are provided in Appendix A. A copy of these forms for wells within Montgomery County (RO-14, RO-15, BR-20, and OB-25) has also been submitted to the Montgomery County Health Department.

#### Section 4 - Conclusions

The information presented in the approved *Ground Water Final Report* and in this *Supplemental Ground Water Final Report*, together with the information incorporated by reference from the *Ground Water Remedial Investigation Report and Cleanup Plan*, demonstrate the attainment of residential Site-Specific Standards for ground water for portions of the Transit America Site, as shown in Figure 2 and summarized below:

- The approximately 17.6 acre Pine Road/Montgomery County parcel.
- The 20-acre South Lot parcel.
- The approximately 11.4 acre Red Lion/Philadelphia County parcel, where a vapor barrier engineering control will be required to eliminate the potential vapor exposure pathway, consistent with Act 2. A restriction will be placed in the deed to establish this engineering control requirement for buildings or structures designated for residential use.

For reference, the areas which will be deed restricted for all media at the Site are presented as Figure 3 in a consolidated format.